

## The Vertical Structure of the Jovian Ring

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The ongoing Galileo imaging of the Jovian system will provide an opportunity to clarify the ring's radial and vertical structure, as well as the size distribution of its constituents, each of which is poorly constrained by Voyager images. Most models of the Jovian ring consider that electromagnetic forces elevate micron-sized grains (which acquire charge from the ambient plasma) out of the equatorial plane. These forces may explain one aspect of the ring system that stands out clearly: the pronounced vertical flaring of the ring in the halo region.

The current state of the observations is not sufficient to distinguish between competing models, and thus we review the various mechanisms proposed to date, highlighting their similarities and differences.

Here we use numerical orbit integrations over a range of particles sizes to follow dust grains originating from the main ring as they evolve by plasma drag through so-called Lorentz resonances. For a range of charge-to-mass ratios and plasma drag rates, large jumps in inclination ensue; these jumps occur near 1.7 and 1.4  $R_J$ , where the vertical thickness of the main ring increases by an order of magnitude to the halo, and where the halo vanishes. This model does not depend strongly on plasma measurements in the ring region: all that is required is some small charge on grains, and any mechanism which gradually draws grains through the resonance zones. From these integrations we produce ring cross-sections which roughly match the halo slice data of Showalter et al.

As part of this study, we have simulated the trajectories of individual particles having widely different charge-to-mass ratios. Not surprisingly, very highly charged grains are closely tied to the magnetic field, while large particles follow nearly Keplerian orbits. Intermediately charged grains have significant excursions, some leaving the system altogether; this occurs especially near Lorentz resonances. These characteristics seem to provide the correct clay from which to mold the jovian ring's morphology.

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